

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. 10/748,450 Art Unit: 1644
Applicant: Richard L. Boyd Examiner: Michail A. Belyavskiy
Date Filed: December 30, 2003 Conf. No. 2366
Docket No. 286336.150US1/NOR-011CP2 Cust. No. 23483
Title: **Stimulation of Thymus for Vaccination Development**

CERTIFICATION UNDER 37 C.F.R. § 1.8

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail on the date indicated below and is addressed to: **Mail Stop Amendment**, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

10/10/2006

Date of Deposit


Rochelle Capobianco

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION OF DR. RICHARD L. BOYD UNDER 37 C.F.R. § 1.132

Dear Sir:

In connection with the above-referenced patent application, I, Richard L. Boyd, declare as follows:

1. I received my Ph.D. degree in Immunology from Monash University, Australia in 1976. I was a Senior Tutor in the Department of Pathology and Immunology at Monash University from 1976-1977. I held a research fellowship at the University of Innsbruck, Austria, from 1978-1982, following which I held a Research Fellow position from 1983-1984. I was a Lecturer at Monash University from 1985-1994. Currently, I am an Associate Professor in the Department of Immunology at Monash University. I am also the Director of the Immunology Platform Program at the Australian Stem Cell Center and the Deputy Director of Monash Immunology

and Stem Cell Laboratories. I have authored or co-authored more than 193 journal articles in the area of immunology and presented over 500 oral presentations at conferences and research institutes. I was the Editor-in-Chief of *Developmental Immunology* from 1999-2003, and a member of the editorial boards of *Developmental and Comparative Immunology* (1993-2003) and of *Clinical and Developmental Immunology* (2004-2006). I review articles for numerous journals including, *Nature*, *Nature Immunology*, *Blood*, *Autoimmunity*, and the *Journal of Experimental Medicine*. I was the recipient of two awards from the Australian Federal Government and a co-recipient of two international prizes for my research. My *curriculum vitae*, which includes a list of my publications and presentations, is provided as **Attachment A** following *page 8* of this Declaration.

2. I am the Chief Scientific Officer of the Assignee of the above application
3. I am the sole inventor of the above-referenced patent application, and accordingly, have read and am familiar with the above-referenced patent application. I am also familiar with the Office Action dated April 10, 2006 (hereinafter "Office Action") in the above-referenced application.
4. As I understand the Office Action, the Examiner rejected the pending claims, in part, as not being enabling (*see*, Office Action, pages 4-7). The Office Action states, in relevant part, that:

Since there is no animal model data and study in the specification showing the effectively [sic] for improving an immune response to a vaccine antigen by disrupting sex steroid mediated signaling through administering one or more pharmaceutical [sic] as claimed in claims 15, 30-33, 35, 36, 39-60, 63-68, 75 and 76, it is unpredictable how to correlate *in vivo* results of regeneration of thymus by removing the effects of sex steroid on the thymus after surgical castration with claimed method for improving an immune response to a vaccine antigen by disrupting sex steroid mediated signaling through administering one or more pharmaceutical [sic] as claimed in claims 15, 30-33, 35, 36, 39-60, 63-68, 75 and 76.

In view of the absence of a specific and detailed description in Applicant's specification of how to effectively use said pharmaceutical composition and vaccine as claimed, and absence of working examples providing evidence which

is reasonably predictive that the claimed pharmaceutical composition and vaccine are effective for in vivo use, and the lack of predictability in the art at the time the invention was made, an undue amount of experimentation would be required to practice the claimed method with a reasonable expectation of success.

5. I respectfully disagree with the Examiner's position. My invention is directed, in part, to a method for improving an immune response to a vaccine antigen in a patient. The method includes reactivating the thymus of the patient and administering a vaccine comprising a vaccine antigen to the patient. This method allows the patient to develop an improved immune response to the vaccine antigen. My patent application teaches a trained clinical immunologist how to make and use the invention as claimed in this application.

6. As a preliminary matter, with respect to the Examiner's comments in the paragraph bridging pages 6-7 of the Office Action, I note that my claimed invention is not directed to developing new vaccines but, rather, to enhance the application of marginally-effective vaccines or enhance efficacy in populations with impaired T cell responses. Such populations include patients who have undergone bone marrow transplant, chemotherapy and/or radiotherapy, and the elderly (Hertogh-Huijbregts *et al.*, *Mech. Ageing Dev.* 53:141–155 (1990); Nicoletti, *Immunobiology* 190:127–137, 1994). The impaired T cell responses in these patients may be caused by: (i) lack of T cells generally, (ii) inappropriate T cell make up, and/or (iii) poor T cell response, among others.

7. It is well known that defective thymic function is very tightly linked to a defective immune system, and it is also widely accepted in the field that improved T cell number and function boosts immune responses (*see, e.g.*, Small *et al.*, *Blood* 93(2):467(1999), Mackall *et al.*, *New Eng. J. Med.* 332:143-149 (1995)), provided the improvement does not skew the TCR repertoire or produce inappropriate activation. A clinical immunologist would be well aware that an effective immune response to a vaccine requires functioning T cells. T helper cells (T_H cells) are required to initiate immune responses including the stimulation of B cells to produce antibodies and cytotoxic T cells (T_c cells) to produce cell-mediated cytotoxicity (*i.e.*, direct killing of cells

e.g. viral infected target cells or cancer cells) (Janeway *et al.*, Immunobiology: The Immune System In Health And Disease, 6th edition, Garland (2005), pp. 33, 361).

8. The anti-CD3/anti-CD28 model of T cell stimulation is widely accepted as an effective model in evaluating overall T cell response to antigen (*see, e.g.*, Abbas & Lichtman, Cellular and Molecular Immunology, 5th edition (updated), Elsevier Saunders (2005), p. 169; Verhoef *et al.*, *Scand. J Immunol.* 50(4):427-432 (1999)). In **Exhibit A**, I provide the results of experiments showing responsiveness of murine T cells to T cell receptor (TCR) stimulation following sex steroid signaling disruption by castration. As you can see, responsiveness of T cells was significantly increased in 18-month old castrated mice compared with uncastrated young mice (2 months) and uncastrated older mice (18 months). Thus, sex steroid inhibition increased T cell responsiveness in aged mice.

In **Exhibit B**, I provide T cell stimulation data from a human study involving 42 patients (greater than 18 years of age and of both sexes), who were diagnosed with malignant or non-malignant haematological disorders requiring chemotherapy and allogeneic transplantation. The treated group (20 patients) received the LHRH agonist, Zoladex, for 4 months at doses of 3.75 mg/kg body wt/month for females, and 7.5 mg/kg body weight/month for males, which are the approved doses in Australia for endometriosis and prostate cancer, respectively. Blood was drawn prior to transplant and at intervals over the 12 months post-transplantation and stimulated with anti-CD3 (5 µg/ml) and anti-CD28 (10 µg/ml) antibodies. As you can see, the Zoladex-treated group showed statistically significant increases in T cell responsiveness *in vitro* to T cell stimulation through the TCR with anti-CD3/CD28 (*see, Exhibit B*). Thus, sex steroid inhibition increases T cell responsiveness of human T cells.

9. I would also like to direct the Examiner's attention to Figures 14 to 19 of my application, where mice were castrated and then inoculated in the hind foot-hock with 4×10^5 pfu of Herpes Simplex virus-1. Lymph nodes were analyzed 5 days post-inoculation for a primary immune response. This work serves as a model for response to vaccine, even though the mice were not

subsequently challenged with a further infectious dose. The loss of sex steroids improves T cell responsiveness and would be expected to improve resistance to challenge. An increase in the number of T cells able to react to antigen would be expected to result in an increase in the number of memory T cells available to respond to challenge. Although there was no follow-up challenge, the model provides an accepted means for assessment of the immune response to antigen challenge. The model is known to involve all aspects of an immune response, mimicking an injected vaccine, namely, the capture of antigen by antigen presenting cells (APC) at the site of entry (presumably by dendritic cells or Langerhans cells), its passage with the APC to the draining lymph node, the recruitment into the lymph node of potential target lymphocytes, the activation of those lymphocytes specific to the antigen and release back into the circulation of those lymphocytes not specific for the antigen (Janeway, pp. 417-426). This leads to development of effector T cells able to remove the virus (Janeway, p. 425). The model thus represents a general physiological immune response as produced by an effective vaccine. Figures 14b and 17b demonstrate that the mice with disrupted sex steroid signaling had a larger number of activated CD8 cells in the lymph node, indicating a greater response to the HSV inoculation, and Figures 15 and 19 indicate that these activated cells demonstrate the appropriate V β type. Figure 18 demonstrates that the inoculation produced a superior CTL response in old castrated mice compared to sham-castrated old mice. In summary, this disclosure, which is in the application-as-filed, would lead a clinical immunologist to recognize that sex steroid inhibition can improve a vaccine response.

10. Data presented in **Exhibit C** pertain to the immune response in aged castrated mice as a proof of concept for the well-known loss of immune capacity in aged humans and, hence, their decreased capacity for responding to vaccines. Mice were immunized intranasally with the Hkx31 influenza virus and culled 7 days later. The data show that when 15-month old mice were castrated 6 weeks prior to immunization, there was a reduction in the proportion of CD8+ T cells (**Exhibit C, Fig. a**) due to larger increases in other lymphoid cells e.g., B cells and CD4+ T cells (data not shown), but importantly there was a statistically significant increase in the

number of CD8+ T cells (**Exhibit C, Fig. e**). T cell response to peptides (NP, PA, and PB) was poor as measured by cytokines necessary for protection against this virus (IFN- γ , TNF- α , and IL-2) (**Exhibit C, Figures f-h**). This is similar to the aging human population, which responds poorly to flu vaccines (Deng *et al.*, *J. Immunol.* 172: 3437–3446 (2004)). Defective CD8+ T cell expansion and low Th1 cytokines are linked to weak immune responses. As a corollary - reversing these would be expected to improve the immune response. When the mice were castrated, there was a significant increase in the production of these cytokines. **Exhibit C, Figure b** shows the proportion of T cells producing IFN- γ increased (reflecting the increase in reactive T cells), as did the total cell number of IFN- γ -producing CD8+ T cells (**Exhibit C, Fig. f**). These cells did not change in the proportion of cells co-producing TNF- α (**Exhibit C, Fig. c**) and IL-2 (**Exhibit C, Fig. d**), indicating that the immune response is normal in the types of cells being activated. These cytokines are widely recognized as being the essential mediators of immunity to viral infections - particularly those requiring Th1 cells (Janeway, pp. 347, 361), which are generally considered the appropriate response for flu. For a vaccine to be successful, adequate levels of these cytokines need to be generated; this is now occurring as a result of the reduction in sex steroids. The consequences of antigen recognition by an armed effector T cell are determined largely by the set of effector molecules it produces on binding a specific target cell (Janeway, p. 351). Thus, the loss of sex steroids increased the number of cells responding to the flu peptides and, hence, improved the ability of the immune system to respond to a vaccine and defend against infection.

11. Finally, in **Exhibit D**, I provide data that show improved vaccine responses as claimed in this application. The data relates to the effect of sex steroid inhibition on the *Hemophilus influenzae* B (HIB) vaccine response in human patients. A group of 17 allogeneic bone marrow transplant (BMT) patients were involved in this study: 11 patients received LHRH analog treatment, while 6 patients did not and served as the control group. The study was conducted as follows: (1) serum samples were collected from the patients 5 months after BMT (the pre-immunization bleed); (2) the patients were vaccinated at 6 months post-transplant with

PedvaxHib (*Hemophilus influenza* vaccine); and (3) a second serum sample was collected from the patients 9 months post-BMT (post-immunization bleed). The response to vaccination was measured using BINDAZYME™ Enzyme Immunoassay kits, (The Binding Site (UK)) with an assay sensitivity of +/- 0.096 µg/ml. Antibody responses above 1.0 µg/ml are considered to be protective (Mariani *et al.*, *Clin. Diag. Lab. Immunol.* 667–674 (1998)).

None of the 6 patients of the untreated group showed response to vaccination. However, 3 of the 11 patients of the treated group showed response to vaccination as demonstrated by a more than a 2-fold increase in antibody level (*see, Exhibit D*). Those 3 patients had ~6.3, 8.5, and 14.9 µg/ml of antibody difference between pre- and post-immunization, whereas the biggest difference observed in the control group was only 1.4 µg/ml. The overall antibody response was decreased in the control group from an average of 3.1 to an average of 2.5, whereas in the treated group the vaccine response increased from an average of 2.5 to 3.9 (*see, Tables 1 and 2*).

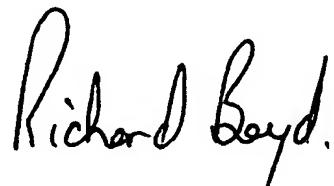
TABLE 1: CONTROLS (6)

PATIENT	SEX	AGE	ILLNESS	Pre-Immun. 5 MONTHS (µg/ml)	Post-Immun. 9 MONTHS (µg/ml)	DIFF. (µg/ml)
ASW	F	51	HODGKINS	1.4	1.9	0.5
DMH	M	34	AML	2.8	0.9	-1.9
LJS	F	43	CML	1.4	2.8	1.4
JM	M	48	HODGKINS	3.1	4.3	1.2
NLS	F	29	HODGKINS	3.7	0.5	-3.2
SJM	F	29	ALL	5.9	4.4	-1.5
AVERAGE				3.1	2.5	-0.6

TABLE 2: LHRH PATIENTS (11)

PATIENT	SEX	AGE	ILLNESS	Pre-Immun. 5 MONTHS (µg/ml)	Post-Immun. 9 MONTHS (µg/ml)	DIFF. (µg/ml)
AAH	M	55	AML	1.1	0.4	-0.7
BFH	M	53	AML	2.7	17.6	14.9
BNB	M	44	AML	4.2	1.7	-2.5
IJM	M	43	ALL	2.5	8.8	6.3
JET	F	36	AML	2.3	0.2	-2.1
JCM	M	43	Myelo- dysplasia	2.0	0.6	-1.4
KLB	F	43	AML	1.0	9.5	8.5
MRP	M	28	ALL	2.4	1.2	-1.2
PGM	M	35	AML	5.1	0.4	-4.7
TAH	M	23	AML	1.9	1.9	0.00
ZEH	M	35	NHL	2.4	1.0	-1.4
AVERAGE				2.5	3.9	1.4

12. In summary, based on the discussion above, I respectfully aver that the instant application does teach how to make and use the invention as claimed.
13. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.



Date: October 10, 2006

Richard L. Boyd, Ph.D.

Appl. No.: 10/748,450

Docket No.: 286336.150US1/NOR-011CP2

Reply to Office Action dated April 10, 2006

ATTACHMENT A

Attached is the *curriculum vitae* of Dr. Richard L. Boyd.

CURRICULUM VITAE

Richard Boyd

October 2005



Born: 18th November 1950, Melbourne, Australia

Marital Status: Married

Nationality: Australian

Academic Qualifications

1973-76 Doctor of Philosophy
Department of Pathology and Immunology
Monash University, Victoria, Australia
Thesis Title: Chicken Lymphoid Tissues: Cellular Differentiation, Microenvironment and Ontogeny

1972 Bachelor of Science, Honours (First Class)
Department of Pathology and Immunology,
Monash University
Thesis Title: Lymphocyte Differentiation -
Membrane Antigenic Changes Associated with Blast Transformation

1969-71 Bachelor of Science, Monash University, Australia
Majors: Biochemistry, Genetics

Academic Appointments

Current Appointments

2005- Deputy Director, Monash Immunology and Stem Cell Laboratories,
Monash University

2003- Director, Immunology Platform Program,
Australian Stem Cell Centre

1995 - Reader / Associate Professor, Department of Immunology (formerly Pathology and Immunology), Monash University.

Previous Appointments.

- 1989 – 94 Senior Lecturer (tenured appointment)
Department of Pathology and Immunology, Monash University.
- 1988 Lecturer (tenured appointment)
Department of Pathology and Immunology, Monash University
- 1985 – 87 Lecturer (fixed term)
Department of Pathology and Immunology, Monash University
- 1984 Research Fellow II,
Department of Pathology and Immunology, Monash University
- 1983 Research Fellow I
Department of Pathology and Immunology, Monash University.
- 1980-82 Research Fellow, Tenured position
(Universitats Vertragsassistent), University of Innsbruck, Austria.
- 1978-79 Research Fellow,
(Universitats Vertragsassistent), University of Innsbruck, Austria.
- 1976-77 Senior Tutor
Department of Pathology and Immunology, Monash University.

Fellowships

- 1983 -84 Monash University Post-doctoral Research Fellowship.
- 1973 -76 Commonwealth Postgraduate Research Award.
- 1969 -72 Victorian Education Department Studentship.
- 1967 -68 Victorian Education Department Bursary.
- 1991 Division of Rheumatology/Allergy, Clinical Immunology, University of California, Davis, California. March - April, 1991. Guest Faculty Professor, University of California.
- 1992 Institute for General and Experimental Pathology, University of Innsbruck, Innsbruck, Austria. April 1992 - September 1992. Guest Professor of the Austrian Academy of Sciences.
1992. Institute for Virology and Immunobiology, University of Wurzburg, Wurzburg, Germany. Guest Professor of the German Research Foundation, Special Research Division (Deutsche Forschungsfond, Sonderforschung Bereichshaft). September December, 1992.
- 1992 –93 Eleanor Roosevelt Fellowship, UICC American Cancer Society International Cancer Research Fellowship. (International Union Against Cancer).
- 1993 Department of Industry, Technology and Regional Development.

(Fellowship for the Ludwig Institute for Cancer Research, Lausanne, Switzerland).

1994 Institute for General and Experimental Pathology, University of Innsbruck, Innsbruck, Austria. February. Guest Professor of the Austrian Academy of Sciences.

1995 Department of Industry, Technology and Regional Development (Fellowship for visit to the Department of Immunology, Massachusetts Institute for Technology, Cambridge, Massachusetts)

1996 Department of Industry, Technology and Regional Development (Fellowship for visit to Ontario Cancer Research Institute, Toronto, Canada).

1999 Institute for General and Experimental Pathology, University of Innsbruck, Innsbruck, Austria. January. Guest Professor of the Austrian Academy of Sciences.

Awards

2003 Australian Federal Government Centenary Medal for Service to International Medical Research and Undergraduate Teaching

2004 Australian Federal Government Business/Higer Education Round Table Award for Outstanding Achievement in Research and Development and Education and training.

Prizes

1981 Preis der Stiftung der Hoechst Aktiengesellschaft, 1981

Effector mechanisms in spontaneous autoimmune thyroiditis in obese strain chickens. R.L. Boyd and G. Wick

1982 Von Basedow-Forschungspreis, 1982

Effector mechanisms in the spontaneous autoimmune thyroiditis of obese strain chickens : analysis of cytotoxic cells.
R.L. Boyd and G. Wick.

Involvement in Current University Initiatives

Executive meetings for Monash Immunology and Stem cell Laboratories, Department of Immunology, and School of Biological Science executives; Animal Ethics.

In addition the following more specialised responsibilities:

1. Member, Forward Planning Committee, Monash University Biomedical Institute (2005 -)
2. Member, Faculty of Medicine Delegation to China, October 27, 28, 2005.
3. Member, Monash-Newcastle (UK) committee for Collaborative Initiatives in Ageing and Stem Cell research (Prato meeting, Italy) (2005 -).
4. Member, committee for collaboration between Monash University and the University of California, San Diego, and University of California, Davis –to establish joint laboratories in stem cells and regenerative medicine. (site visit July 2005)

Society Memberships

Australian Society for Immunology

IgV – Victorian Branch of Australian Society for Immunology (Foundation Committee member, 1995)

International Union Against Cancer (UICC). Life Member

International Society for Stem Cell Research (ISSCR)

Editorial and Scientific Appraisal Services

Editor-in-Chief Developmental Immunology 1999 - 2003

Member Editorial Board, Developmental and Comparative Immunology. 1993 – 2003

Member Editorial Board, Clinical and Developmental Immunology 2004-

Review for:

Autoimmunity

Blood

Experimental Biology and Medicine

European Journal of Immunology

Immunity

Immunology and Cell Biology

Journal of Autoimmunity

Journal Clinical Investigation

Journal Experimental Medicine

Journal of Immunology

Nature

Nature Immunology

Nature Reviews Immunology

Proceedings National Academy of Sciences

Trends in Immunology

Review Grants and Fellowships for:

Alfred Hospital, Melbourne

Anti-Cancer Councils of Victoria, New South Wales and Queensland

Australian Research Council

Human Frontier Science Program

MRC United Kingdom

National Institutes for Health, Bethesda

NH&MRC, Australia

New Zealand HRC

Raine Foundation, Western Australia

USA - Israel Binational Science Foundation

International Committees.

1. Member, Organising Committee, German Society for Immunology, Innsbruck, 1979.

2. Member, Cluster of Thymic Epithelial Staining (CTES) nomenclature committee (1989 - 1995).

3. Member, Organising Committee for Australian Society for Immunology Annual Scientific Meeting, Melbourne, 1990.

4. Member, Avian Leucocyte CD nomenclature committee (1990 - 2000).

5. Member, Scientific and Organising Committees, Foundation member, International Workshop on the Thymus. Rolduc, The Netherlands. 1988, 1991, 1995, 1997, 2001, 2004.
6. Chairman, Organising and Scientific Committee, International Workshop on T Lymphocytes, Heron Island. ThymOz I Oct 11 -15, 1995, ThymOz II March 25 - 29, 1998, ThymOz III April 11-18, 2000, ThymOz IV April 1-5, 2003, ThymOv V April 5-10, 2005
7. Co-chairman, Organising Committee for International Conference on Germinal Centres and Lymphatic Tissues in Immune Reactions, Graz, Austria. 1996.
8. Co-Chairman, Organising Committee, Australian Society for Immunology Annual General Meeting, Melbourne, Dec 1998.
9. Member, Scientific Committee, 14th International conference on lymphatic tissues and germinal centres in immune reactions. Groningen, June 23-27, 2002.
10. Member Scientific Organising committee, 2nd Australian Stem Cell Conference, Sydney. 2004.
11. Member, Scientific Committee, 15th International conference on lymphatic tissues and germinal centres in immune reactions. Potsdarm. Germany. 2005.
12. Chairman, organising Committee, "Rebuilding Immunity for Better Health – an interface between immunology, stem cells and regenerative medicine." Monash University, October 6 – 7th, 2005.

Invitations to Conferences

More than 500 oral presentations to conferences and research institutes.

1. 1984 I.U.I.S. Symposium on Autoimmunity, March 18-24 Igls, Austria.
2. 1998 Invited Speaker, Spring Session, Tasmanian Haematology, Immunology and Neoplasia Group, Ross, Tasmania. April.
3. 1988 Invited Speaker, The Thymus: Histophysiology and Diagnosis in the Immune System. Rolduc. The Netherlands. May.
4. 1988 Invited Speaker, Understanding Modern Biotechnology Workshop, Monash University. July.
5. 1990 Invited Chairperson, Thymus Workshop: Conference on T lymphocyte Development and function, Rolduc, The Netherlands. May.
6. 1990 Invited Symposium Speaker, Annual Meeting, Australian Society for Immunology, Melbourne. December.
7. 1991 Invited chairperson, 10th International Conference on Lymphatic Tissues and Germinal Centres in Immune Reactions, Compiegne, France. July.

8. 1992 Invited Chairperson and Speaker, 7th. Winter Conference on Controversial Immunology, Igls, Austria. April.
9. 1992 Invited Chairperson, Thymus Workshop: Conference on T lymphocyte Development and function, Rolduc, The Netherlands. May.
10. 1992 Invited Symposium Speaker, Annual Meeting Australian Society for Immunology, Auckland. December.
11. 1993 Invited chairperson, 11th International Conference on Germinal Centres and Lymphatic Tissues in Immune Reactions, Liege, Belgium. June.
12. 1993 Invited Symposium Speaker, Annual Meeting of the Austrian Society for Allergy and Immunology, Graz, Austria. July.
13. 1993 Invited chairperson and Symposium Speaker, Joint Meeting, Australasian Society for Immunology / Society for Leucocyte Biology, Sydney. December.
14. 1994 Invited Symposium Summary, Thymus Workshop: Conference on T lymphocyte Development and function, Rolduc, The Netherlands. May.
15. 1994 Invited Symposium Speaker, International Conference on Scleroderma, Sydney. July.
16. 1994 Invited speaker, Immunology and Developmental Biology of the Chicken, Basel Institute for Immunology, Basel, Switzerland. November.
17. 1995 Invited Co-chairman, 9th. International Congress of Immunology, San Fransisco, California. USA. July.
18. 1996 Invited Symposium Speaker, Australian Poultry Science Symposium, Sydney, Feb 6-7.
19. 1996 Invited Symposium Speaker, International Symposium on Avian Endocrinology, Alberta, Canada, March 31 - April 5.
20. 1996 Invited Keynote Speaker, Avian Immunology Workshop, Obergurgl, Austria, April 21 –24.
21. 1996 Invited Symposium Speaker, 5th International Expert Forum on Immunotherapy and Gene Therapy, Jerusalem, June 4-9, 1996.
22. 1996 Invited Symposium Speaker and Workshop Chairman, 12th International Conference on Lymphoid Tissues and Germinal Centres in Immune Reactions, Graz, Austria, July 1-5, 1996.
23. 1996 Invited Plenary Session Speaker, First Congress of the Federation of Immunological Societies of Asia-Oceania, (ASI) Adelaide, Dec 1-5.
24. 1997 Invited Chairperson 5th Conference of the Immunology Group of Victoria, Mt. Buffalo, March 16-18.
25. 1997 Invited speaker, International Workshop on Thymus, Rolduc/Kerkrade Holland, March 23-26.

26. 1997 Invited Symposium speaker 5th Kyoto T Cell Meeting, Kyoto, October 2-4.
27. 1997 Invited Symposium speaker and Chairperson, XIIIth Int Congress of Comparative Endocrinology, Yokoma Nov 17-21.
28. 1998 Plenary Chairperson, symposium speaker, 25th Annual Meeting Australian Soc Immunology, Melbourne Nov 29-Dec3.
29. 1999 Invited Speaker, FASEB/Clinical Immunology. Washington April 19-21.
30. 1999 Invited Speaker, Rolduc International Workshop on Thymus, May 1-4.
31. 1999 Invited Speaker, Austrian Academy of Science Special Symposium in Honour of G. Wick, Innsbruck, May 8.
32. 1999 Invited Symposium Speaker, 6th Asia/Oceania Regional Congress of Gerontology, June 8-11.
33. 1999 Invited Speaker and Workshop Chairman, 13th International Conference on Lymphoid Tissues and Germinal Centres in Immune Reactions, Geneva, Switzerland 1-6.
34. 2000 Invited Symposium speaker and Chairperson, VII International Society Avian Endocrinology, Varanasi, India, Feb 1-5.
35. 2000 Invited Symposium speaker, XXI World Poultry Congress, Montreal, August 20-24.
36. 2000 Invited Chairperson. Australian Society for Immunology, Sydney. Dec.
37. 2001 Invited Symposium speaker. Thymus Workshop. Rolduc. Kerkrade. The Netherlands, May 12-15.2001.
38. 2001 Invited Speaker: IgV Meeting, Mt Buffalo, Victoria, October 14-16.
39. 2001 Invited Keynote Address, ThymUS International thymus meeting, Peurto Rico, November 2-6.
40. 2001 Invited Chairperson, ThymUS International Thymus Meeting, Peurto Rico, November 2-6.
41. 2001 Invited Chairperson, Australian Society for Immunology, Canberra. December 1-4.
42. 2002 Invited symposium speaker, Kyoto T Cell Conf. (KTCC), Kyoto, Japan, April 3-5.
43. 2002 Invited Symposium Speaker and Chairman, 14th International Conference on Lymphoid Tissues and Germinal Centres in Immune Reactions, Groningen, The Netherlands, June 23-27.
44. 2002 Invited Symposium Speaker, Federation of Immunological Societies of Australasia, Beijing China, October.

45. 2002 Invited key Note Speaker, Australian Society of Medicine, Canberra, Nov 21-23,
46. 2003 Invited speaker and corporate presentation Bio 2003, Washington June 22-27.
47. 2003 Invited Speaker, Workshop chairman, 1st National Stem cell Conference, Melbourne Oct 9-11.
48. 2003 Invited Speaker, First Barossa Meeting (Science amongst the Vines), "Regeneration". Barossa Valley South Australia. Nov 19-21.
49. 2003 Invited Symposium Speaker, Japanese Society for Immunology, December, 7-10.
50. 2004 Invited Symposium speaker. Swiss Society for Allergy and Immunology, Geneva April 15-17.
51. 2004 Invited Speaker, Rolduc International T cell Workshop, Rolduc. The Netherlands. May 1-5.
52. 2004 Invited speaker, Japanese Society for the Promotion of Science, Core-to-Core Workshop on Thymus Organogenesis'. Tokushima August 16-18.
53. 2004 Invited Speaker, ThymUs - International Workshop on the Thymus. Puerto Rico, November.
54. 2004 Invited Speaker and Symposium Chairperson, 2nd Australian Stem Cell Conference/ Australian Health and medical Research Congress, November, Sydney.
55. 2004 Invited Speaker, International Conference on NKT cells, Heron Island, 8th -13th September
56. 2004 Invited Symposium Speaker, British Society for Immunology, December 10th, Harrogate. UK.
57. 2004 Invited Symposium Speaker, Australian Society for Immunology, Adelaide, December
58. 2005 Invited Speaker, Lorne Cancer Conference, Phillip Island, Victoria, February
59. 2005 Invited Speaker, 8th International Symposium on GnRH Analogues in Cancer and Human Reproduction, February, Salzburg, Austria.
60. 2005 Invited Speaker, Kyoto T Cell Conference, April 6-10, Kyoto, Japan
61. 2005 Invited Speaker, Japanese Society for the Promotion of Science, Core-to-Core Workshop on Thymus Organogenesis' April 11-12. Tokushima, Japan.
62. 2005 Invited Speaker, 3rd Congress of Federation of Immunology Societies of Asia-Oceania (FIMSA), Hangzhou, April 18-22.
63. 2005 Invited Speaker and Scientific Committee member, 15th International conference on lymphatic tissues and Germinal Centres in Immune Reactions . April 20-24 Potsdam, Germany

64. 2005 Invited Speaker Advances in Agricultural and Medical Biotechnology, 29-30 September Kuala Lumpur.
65. 2005 Invited Speaker, 6th Australian Peptide Conference, October 9-14, Hamilton Island, Queensland.
66. 2005 Invited Speaker, 10th Annual Australian Autoimmunity, 19-21st October.
67. 2005 Invited Speaker, Science in the Vines, November, Barossa Valley. South Australia
68. 2005 Invited Symposium Speaker. 35th Annual Meeting Australasian Society for Immunology. December 4-8 Melbourne.
69. 2005 Invited Lecturer, Post-graduate Teaching Workshop, 35th Annual Meeting Australasian Society for Immunology. December 4-8 Melbourne.
70. 2005 Invited Speaker, Joint meeting of Monash and University of Newcastle, Prato, Italy February 27 – March 1.
71. 2006 Invited Speaker, Discovery Science and Biotechnology, Melbourne May 5-8.

Postgraduate Student Supervision

PhD Completed	27
PhD Current	14
M.Sc. Completed	2
M.Sc. Current	1
B.Sc. (Hons) completed	61
B.Sc. (Hons) current	2

Community Service

Member, Committee Sandringham Little Athletics Club: 1992 – 2001

Team Manager, East Sandringham Junior Football Club: 1996 – 2001

Member Sandringham Primary School Council: 1999 – 2002

Member Premises Committee, Sandringham Primary School: 1997 – 2001

Member Sandringham Primary School committee – Looking to Sandy's Future: 2000

President Sandringham Little Athletics Club: 1996 – 2001

Life Member, Sandringham Little Athletics Club 2001-

Publications

1. **Boyd, R.L.**, Rolland, J.M. and Cauchi, M.N. (1974) Membrane antigenic changes associated with PHA transformation of mouse spleen cells *in vitro*. Immunolog. Commun., **3** : 337-349.
2. **Boyd, R.L.**, Ward, H.A. and Muller, H.K. (1976) Antisera specific for the reticulin of the bursa of Fabricius. Int. Archs of Allergy and Appl. Immunol., **50**:129-132.
3. Clarke, G.N., **Boyd, R.L.** and Muller, H.K. (1977) Actin-like protein in human sperm heads. In "Immunological Influence of Human Fertility" Ed. B. Boettcher, (Academic Press, Sydney, New York, London), pp. 211-214.
4. **Boyd, R.L.** , Toh, B.H., Muller, H.K. and Ward, H.A. (1977) Actin-like protein in chicken and mammalian lymphoid tissue demonstrated by reactivity with human smooth muscle autoantibody. Int. Arch. Allergy Appl. Immunol. **55**:283-292.
5. **Boyd, R.L.** and Ward, H.A. (1978) Lymphoid antigenic determinants of the chicken: cellular representation and tissue localization. Immunology, **34**:9-17.
6. **Boyd, R.L.** and Ward, H.A. (1978) Antigenic changes associated with chicken B lymphocyte development. In "Advances in Experimental Medicine and Biology", **114** Eds. W. Muller-Ruchholtz and H.K. Muller-Hermelink. (Plenum Press, New York), pp.25-30.
7. Wick, G., Kofler, R., Gundolf, R., Muller, P.U. and **Boyd, R.L.** (1979) The nature of effector cells in experimental and spontaneous autoimmune thyroiditis. In 6th International Convocation on Immunology : "Immunopathology", Eds. F. Milgrom and B. Albini, (S. Karger Verlag Basel) pp. 101-106.
8. Wick, G. and **Boyd, R.L.** (1979) Effector mechanisms in thyroid autoimmune diseases. In: Autoimmunity in Thyroid Diseases, Eds. E. Klein and F.A. Forster, (F.K.Schattauer Verlag, Stuttgart, New York) pp. 23-29.
9. **Boyd, R.L.** and Ward, H.A. (1979) Induction of B- and T-cell differentiation by chicken bursa and thymus reticular epithelial cells. In "Cell Biology and Immunology of Leucocyte Function". pp. 235-239.
10. **Boyd, R.L.**, Barr, I.G., Ward, H.A. and Muller, H.K. (1979) Antigenic and functional properties of bursal and thymic reticular epithelial cells. Folia Biol. **25**:310-312.
11. **Boyd, R.** and Wick, G. (1979) Effector mechanisms in spontaneous autoimmune thyroiditis of Obese strain chickens. Folia Biol. **25**:340-342.
12. **Boyd, R.** and Wick G. (1979) Role of suppressor cells in autoimmune diseases. In European Surgical Research. Ed. W. Brendl, (S. Karger Verlag, Basel) pp.212-213.
13. **Boyd, R.** and Ward H.A. (1979) Antigenic changes associated with chicken B lymphocyte differentiation. Immunobiol. **156**:186.
14. **Boyd, R.**, Schauenstein, K. and Wick, G. (1979) Characterization of effector cells in spontaneous autoimmune thyroiditis. Immunobiol. **156**:244.
15. **Boyd, R.L.** and Wick, G. (1980) Killer cells in the chicken : a microcytotoxicity assay using antigen-coated erythrocytes as targets. J.Immunol. Methods. **35**: 233-247.

16. Wick, G. and **Boyd, R.** (1980) Effector and suppressor cells in Obese strain (OS) chickens with spontaneous autoimmune thyroiditis. Fed. Proc. **39**: 570.
17. **Boyd, R.** and Wick, G (1980) Effector mechanisms in spontaneous autoimmune thyroiditis in Obese strain chickens. In : Proceedings of the Serono Symposia; Ed. D. Doniach, G.F. Fenzi and L. Bachieri. Academic Press, London, New York, pp.199-206.
18. **Boyd, R.L.** and Wick, G. (1981) Ontogenetic development of cytotoxic and suppressor cells in Obese strain (OS) chickens with spontaneous thyroiditis. In: Aspects of Developmental and Comparative Immunology I. Ed. J.B. Solomon (Pergamon Press, Oxford, New York) pp. 543-544.
19. **Boyd, R.L.**, Barr, I.G., Ward, H.A. and Muller H.K. (1980) Functional and antigenic analysis of the bursal and thymic microenvironments. In : Aspects of Developmental and Comparative Immunology 1. Ed. J.B. Solomon, (Pergamon Press, Oxford, New York) pp.537-538.
20. Wick, G., **Boyd, R.L.**, Hala, K., de Carvalho, L., Muller, P.U. and Cole, R.K. (1981) The Obese strain (OS) of chickens with spontaneous autoimmune thyroiditis. Review of recent data. Curr. Top. Microbiol. and Immunol. **91**: 110-128.
21. Wick, G., **Boyd, R.L.**, de Carvalho, L. and Roitt, I.M. (1981). Analysis of suppressor cells in chickens of the Obese strain (OS) with spontaneous autoimmune thyroiditis. In : Cellular and Molecular Mechanisms of Immunologic Tolerance. Ed. T. Hraba and M. Hasek. Marcel Dekker, Inc. New York, Basel pp. 501-506.
22. Wick, G., **Boyd, R.L.** and de Carvalho, L. (1981) The role of T cells in spontaneous autoimmune thyroiditis in OS chickens. Fed. Proc. **40**: 1140.
23. Hala, K., **Boyd, R.L.** and Wick, G. (1982) Chicken major histo-compatibility complex and disease (review). Scand J. Immunol. **14**: 607-616.
24. Wick, G., **Boyd, R.L.**, Hala, K., Thunold, S. and Kofler, H. (1982) Pathogenesis of spontaneous autoimmune thyroiditis in Obese strain (OS) chickens. Clin. Exp. Immunol. **47**: 1-18.
25. Thunold, S., **Boyd, R.**, Schauenstein, K. and Wick, G. (1982) Tissue localization of lymphocyte surface antigens and receptors for IgG-Fc and C' in the chicken. J. Histochem. Cytochem. **30**: 201-206.
26. Woods, G.M. and **Boyd, R.L.** (1982) Contact-dependent expression of actin in chicken lymphocytes in vitro. Int. Arch. Allergy Appl. Immunol. **67**: 335-339.
27. **Boyd, R.L.** and Wick, G. (1982) Effector mechanisms in the spontaneous autoimmune thyroiditis of Obese strain (OS) chickens : Analysis of cytotoxic cells. Int. Arch. Allergy. Immunol. **69**: 286-295.
28. Wick, G., Schauenstein, K., Thunold, S. and **Boyd, R.L.** (1982) IgG-Fc and C3 receptors in the chickens: distribution tissue localization and functional significance. Molec. Immunol. **19**: 1267-1273.
29. Barr, I.G., Alderton, M.R., Brumley, J.L., **Boyd, R.L.**, Muller, H.K. and Ward H.A. (1982) Antigens associated with bursal and thymic reticular epithelial cells. Advances in Experimental Medicine and Biology. **149**: 711-717.

30. Wick, G., **Boyd, R.L.** and Muller, P.U. (1982) The effect of Cyclosporin A on spontaneous autoimmune thyroiditis in the Obese strain (OS) of chickens. Advances in Experimental Medicine and Biology. **149**: 19-23.
31. **Boyd, R.L.**, Hala, K., Boyd, J. and Wick, G. (1982) Quantitative analysis and interactions of immunoregulatory cells in the chicken thymus. Immunobiol. **163**: 156.
32. Traill, K.N., Bock, G., **Boyd, R.L.** and Wick, G. (1983) Chicken thrombocytes. Isolation, serological and functional characterization using the fluorescence activated cell sorter. Dev. Comp. Immunol. **7**: 111-125.
33. **Boyd, R.L.**, Ward, H.A. and Muller, H.K. (1983) Bursal and thymic reticular epithelial cells in the chicken : Preparation of in vitro monolayer cultures. J. Retic. Soc. **34**: 371-382.
34. **Boyd, R.L.**, Ward, H.A. and Muller, H.K. (1983) Bursal and thymic reticular epithelial cells in the chicken : Induction of B and T lymphocyte differentiation by in vitro monolayer cultures. J. Retic. Soc. **34**: 383-393.
35. **Boyd, R.L.** and Wick, G. (1983) Genetically controlled degree of autoimmune thyroiditis in Obese strain (OS) chickens is expressed at both the humoral and cellular level. Immunol. Commun. **12**: 263-272.
36. **Boyd, R.L.** and Wick, G. (1983) Autoimmune thyroiditis of Obese strain (OS) chickens. Immunopathologie: Collection Foundation Marcel Merieux pp. 113-119.
37. **Boyd, R.L.** and Ward, H.A. (1984) Lymphoid antigenic determinants of the chicken: ontogeny of bursa-dependent lymphoid tissue. Dev. Comp. Immunol. **8**: 149-167.
38. **Boyd, R.L.**, Oberhuber, G., Hala, K. and Wick, G. (1984) Obese strain (OS) chickens with spontaneous autoimmune thyroiditis have a deficiency in thymic nurse cells. J. Immunology, **132**: 718-724.
39. Hala, K., **Boyd, R.L.**, Wolf, H., Bock, G. and Wick, G. (1984) Functional analysis of B-L (Ia-like) antigen bearing chicken peripheral blood cells. Scand. J. Immunol. **20**: 15-19.
40. Wolf, H., Hala, K., **Boyd, R.L.** and Wick, G. (1984) MHC and non-MHC-encoded surface antigens of chicken lymphoid cells and erythrocytes recognized by polyclonal xeno-, allo- and monoclonal antibodies. Eur. J. Immunol. **14**: 831-839.
41. Wick, G., Hala, K., Wolf, H., **Boyd, R.L.** and Schauenstein, K. (1984) Distribution and functional analysis of B-L/Ia positive cells in the chicken : expression of B-L/Ia antigens on thyroid epithelial cells in spontaneous autoimmune thyroiditis. Molec. Immunol. **12**: 1259-1265.
42. Hala, K., Wick, G., **Boyd, R.L.**, Wolf, H., Bock, G. and Ewert, D.L. (1984) The B-L (Ia-like) antigens of the chicken, lymphocyte plasma membrane distribution and tissue localization. Dev. Comp. Immunol. **8**: 673-682.
43. Traill, K.N., Bock, G., **Boyd, R.L.**, Ratheiser, K. and Wick, G. (1984). Ontogeny of surface markers on functionally distinct T cell subsets in the chicken. Eur. J. Immunol. **14**: 61-67.

44. Wick, G., Oberhuber, G., **Boyd, R.L.** and Hala, K. (1984). Obese strain (OS) chickens with spontaneous autoimmune thyroiditis have a deficiency in thymic nurse cells. In: Lymphoid cell function in Ageing, Ed. A.L. de Weck. Topics in Aging Research in Europe, Vol. 3. EURAGE Rijswijk 1984, pp. 39-46.
45. Andrews, P. and **Boyd, R.L.** (1985). The murine thymic nurse cell : an isolated thymic microenvironment. Eur. J. Immunol. **15**: 36-42.
46. **Boyd, R.L.**, Hala, K. and Wick, G. (1985). Interactions and quantitative analysis of immunoregulatory cells in the chicken thymus. J. Immunol. **135**: 3039-3049.
47. Andrews, P., **Boyd, R.L.** and Shortman, K. (1985). The limited immunocompetence within murine thymic nurse cells. Eur. J. Immunol. **15**: 1043-1048.
48. Scollay, R., Andrews, P., **Boyd, R.** and Shortman, K. (1985) The role of the thymic cortex and medulla in T cell differentiation. Adv. Exp. Med. Biol. **186**: 229-234.
49. Shortman, K., Scollay, R., Wilson, A., Andrews, P., **Boyd, R.**, Butcher, E., Weissman, I. (1986). Mature and immature thymocytes: surface phenotype, immune function and intrathymic location. Prog. in Leukocyte Biology Vol. 5. (Eds. Oppenheim, J.J. and Jacobs, D.M.), pp. 3-10.
50. Shortman, K., Scollay, R., Andrews, P. and **Boyd, R.L.** (1986). Development of T lymphocytes within the thymus and within thymic nurse cells. Current Topics Microbiol. Immunol. **126**: 5-18.
51. **Boyd, R.L.**, Wilson, T.J., Mitrangas, K. and Ward, H.A. (1987) Characterization of chicken thymic and bursal stromal cells. In: Avian Immunology II, Eds W.T. Weber and D.L. Ewert; Alan R. Liss Inc. New York, N.Y. pp 29-39.
52. **Boyd, R.L.** , Mitrangas, K., Ramm, H.C., Wilson, T.J., Fahey, K.J. and Ward, H.A. (1987) Chicken B lymphocyte differentiation : ontogeny, bursal microenvironment and effect of IBD virus. In : Avian Immunology II. Eds. W.T. Weber and D.L. Ewert; Alan R. Liss Inc. New York, N.Y. pp. 41-51.
53. Helme, R.D., Eglezos, A., Dandie, G.W., Andrews, P.V. and **Boyd, R.L.** (1987). The effect of Substance P on the regional lymph node antibody response to antigenic stimulation in capsaicin pre-treated rats. J. Immunol. **139**:3470-3473.
54. Eglezos, A., Helme, R.D., Dandie, G.W., Andrews, P.V. and **Boyd, R.L.** (1988). Substance P-Mediated modulation of the primary antibody response. Adv. Exp. Med. Biol. **237**: 499-503.
55. Godfrey, D.I., Izon, D.J., Wilson, T.J., Tucek, C.L. and **Boyd, R.L.** (1989). Ontogeny, in vitro culture and modulation by immunosuppression in vivo of thymic stromal elements defined by M.Abs. Adv. Exp. Med. Biol. **237**: 269-276
56. Tratkiewicz, J.A., Szer, J. and **Boyd, R.L.** (1989). Are LAK cells a possible form of immunotherapy? Adv. Exp. Med. Biol. **237**: 447-450
57. Tratkiewicz, J.A., Szer, J. and **Boyd, R.L.** (1989). Blood Leukocyte NK activity as an early indicator of leukaemic relapse. Adv. Exp. Med. Biol. **237**: 451-456

58. Ramm, H.C., Mitrangas, K.H., Wilson, T.J., **Boyd, R.L.** and Ward, H.A. (1989). Chicken B lymphocyte differentiation - ontogeny and bursal microenvironment. Adv. Exp. Med. Biol. **237**: 69-74
59. Wilson, T.J., Mitrangas, K.H., Ramm, H.C., **Boyd, R.L.** and Ward, H.A. (1989). Response of chicken bursa stroma to treatment with cyclophosphamide and IBD virus. Adv. Exp. Med. Biol. **237**: 75-8
60. Shortman, K., Vremec, D., D'Amico, A., Battye, F. and **Boyd, R.L.** (1989). Nature of the thymocytes associated with dendritic cells and macrophages in thymic rosettes. Cell Immunol. **119**: 85-100
61. Tucek, C.L., **Boyd, R.L.** and Hiai, H. (1989) Antigens shared by thymic stromal cells and T lymphocytes are abnormally expressed in AKR thymuses. Thymus **14**: 95-107.
62. Van de Water, J., Haapanen, L., **Boyd, R.L.**, Abplanalp, H. and Gershwin, M.E. (1989) Identification of T cells in early dermal lymphocytic infiltrates in avian scleroderma. Arthritis and Rheumatism **32**:73-82
63. Waanders, G.A., Godfrey, D.I. and **Boyd, R.L.** (1989) Modulation of T cell differentiation in murine fetal thymus organ cultures. Thymus **13**:73-82
64. Kampinga, J., Berges, S., **Boyd, R.L.**, Brekelmans, P., Colic, M., van Ewijk, W., Kendall, M., Ladyman, H., Nieuwenhuis, P., Ritter, M., Schuurman, H-J. and Tournefier, A. (1989) Thymic epithelial antibodies: immunohistologic analysis and introduction of CTES nomenclature. Summary of the Rolduc Epithelium Workshop. Thymus **13**:165-173.
65. Izon, D.J., **Boyd, R.L.** , Waanders, G.A. and Kelso, A. (1989). The myelopoietic inducing potential of mouse thymic stromal cells. Cell Immunol. **124**: 264-277
66. **Boyd, R.L.** , Izon, D.J., Godfrey, D.I., Wilson, T.J. and Tucek, C.L. (1989). Complex heterogeneity of the thymic stroma. Adv. Exp. Med. Biol. **237**: 263-269.
67. Izon, D.J. and **Boyd, R.L.** (1990). The cytoarchitecture of the human thymus detected by monoclonal antibodies. Human Immunol. **27**:16-32
68. Tratkiewicz, J., Szer, J. and **Boyd, R.L.** (1990) Lymphokine activated killer cytotoxicity against leukaemic blast cells. Clin. Exp. Immunol. **80**: 94-99.
69. Godfrey, D.I., Izon, D.J., Tucek, C.L., Wilson, T.J., and **Boyd, R.L.** (1990). The phenotypic heterogeneity of murine thymic stromal cells. Immunology, **70**: 66-74.
70. Hugo, P., Waanders, G.A., Scollay, R., Shortman, K. and **Boyd, R.L.** (1990) Ontogeny of a novel CD4⁺ CD8⁻ CD3⁻ thymocyte subpopulation: a comparison with CD4⁻ CD8⁺ CD3⁻ thymocytes. Internat. Immunol. **2**: 209-218.
71. **Boyd R.L.**, Wilson T.J., Mitrangas K. and Ward H.A. (1990). Phenotypic characterization of chicken bursal stromal elements. Dev. Immunol. **1**: 41-51.
72. Wilson T.J. & **Boyd R.L.** (1990). The ontogeny of chicken bursal stromal cells defined by monoclonal antibodies. Dev. Immunol **1**: 31-39.

73. Wilson T.J. and **Boyd R.L.** (1990). Cyclophosphamide and testosterone induced alterations in chicken bursal stroma identified by monoclonal antibodies. Immunology **70**: 241-246.
74. Waanders, G.A. and **Boyd, R.L.** (1990). The effects of IL2 on early and late thymocyte differentiation foetal thymus organ culture. Internat. Immunol. **2**: 461-468.
75. Van de Water, J., Wilson T.J., Haapanen, L.A., **Boyd, R.L.**, Abplanalp, H. and Gershwin, M.E. (1990). Ontogeny of T cell development in avian scleroderma. Clin. Immunol and Immunopathol. **56**: 169-184.
76. Tucek, C.L. and **Boyd, R.L.** (1990). Surface expression of CD4 and Thy-1 on mouse thymic stromal cells. Internat. Immunol. **2**: 593-601.
77. Allison, J., Mullbacher, A., Cox, K., Morahan, G., **Boyd, R.**, Scollay, R., Blanden, R.V. and Miller, J.F.A.P. (1990). Selection of the T cell repertoire in transgenic mice expressing a transplantation antigen in distinct thymic subsets. Proc. Royal Soc Lond. B **241**: 170-178.
78. Eglezos, A., Andrews, P.V., **Boyd, R.L.** and Helme, R.D. (1990) Effects of capsaicin treatment on immunoglobulin secretion in the rat. Further evidence for involvement of tachykinin containing afferent nerves. J. Neuroimmunol. **26**: 131-138
79. Ramm, H.C., Wilson T.J., Boyd, R.L. , Ward, H.A., Mitrangas, K. and Fahey, K.J. (1991). The effect of infectious bursal disease virus on B lymphocytes and bursal stromal components in specific pathogen-free (SPF) chickens. Dev. Comp. Immunol. **15**: 369-381.
80. **Boyd, R.L.** , Wilson, T.J., Van de Water, J., Haapanen, L., Ward, H.A. and Gershwin, M.E. (1991). Selective abnormalities in the thymic microenvironment associated with avian scleroderma, an inherited fibrotic disease of L 200 chickens. J. Autoimmunity **4**: 369-380.
81. Gruschwitz, M.S., Moormann,S., Kromer, G., Sgonc, R., Dietrich, H., Boeck, G., Gershwin, M.E., **Boyd, R.L.** and Wick, G. (1991). Phenotypic analysis of skininfiltrates in comparison with peripheral blood lymphocytes, spleen cells and thymocytes in early avian scleroderma. J. Autoimmunity **4**: 577-593.
82. Hugo, P., Waanders, G.A., Scollay, R., Petrie, H.T. and Boyd, R.L. (1991) Characterization of immature CD4+CD8-CD3- thymocytes. Eur. J. Immunol. **21**: 835-838.
83. Hugo, P., Waanders, G.A., **Boyd, R.L.** and Scollay, R. (1991). CD4+CD8+CD3^{high} thymocytes represent a cortisone-resistant subset differentiating into mature T cells. In: Lymphatic Tissues and In Vivo Immune Responses. Eds.Imhof, B.,Berrih-Aknin,S. and Ezine, S., Marcel Dekker Inc. New York. 1991. p155-160.
84. Hugo, P., Waanders, G.A., Scollay, R., Shortman, K. and **Boyd, R.L.** (1991). CD4+CD8- CD3- thymocytes: an alternative route to generate double positive, CD4+CD8+, thymocytes. In: Lymphatic Tissues and In Vivo Immune Responses. Eds.Imhof, B.,Berrih-Aknin,S. and Ezine, S., Marcel Dekker Inc. New York. 1991 p141-146.
85. Hugo, P., **Boyd, R.L.** , Waanders, G.A., Petrie, H.T. and Scollay, R. (1991).Timing of deletion of autoreactive Vb6+ cells and down-modulation of either CD4 or CD8 on

phenotypically distinct CD4+CD8+ subsets of thymocytes expressing intermediate or high levels of T cell receptor. Internat. Immunol. **3**:265-272

86. Boyd, R.L. and Hugo, P. (1991). Towards an integrated view of thymopoiesis. Immunology Today **12**: 71-79.
87. Hugo, P., Boyd, R.L. and Scollay, R.S. (1991). CD4+CD8+CD3hi thymocytes appear transiently during ontogeny: evidence from phenotypic and functional studies. Eur. J.Immunol. **21**: 2655-2660.
88. Davidson, N.J., Bean, A.G. and Boyd, R.L. (1991). Chicken fetal thymic organ culture: a model for T cell development within the thymic microenvironment.In: Lymphatic Tissues and In Vivo Immune Responses. Eds.Imhof, B.,Berrih-Aknin,S. and Ezine, S., Marcel Dekker Inc. New York. 1991. p89-94.
89. Ladyman, H., Boyd, R., Brekelmans, P., Colic, M., van Ewijk, W., von Gaudecker, B., Kampinga, J. Kendall, M., Nieuwenhuis, P., Schuurman, H-J., Tournefier, A. and Ritter, M. (1991). Monoclonal antiepithelial antibody workshop. II. Flow cytometric analysis and biochemical analysis of thymic epithelial cell heterogeneity. in: Lymphatic Tissues and In vivo Immune Responses. Eds. Imhof, B.A., Berrih-Aknin and Ezine,S. Marcel Dekker Inc. New York. p15-20.
90. Kendall, M.D. and Boyd, R.L. (1991). The diversity of thymic epithelial cells. Proceedings of the 10th International Conference on Lymphatic Tissues and Germinal Centres in Immune reactions, Marcel Dekker Inc., New York (in press). Lymphatic Tissues and In vivo Immune Responses. Eds. Imhof, B.A., Berrih- Aknin and Ezine,S. Marcel Dekker Inc. New York.p11-14.
91. Boyd, R.L. (1991). Summary of Thymic Epithelium Session., 10th International Conference on Lymphatic Tissues and Germinal Centres in Immune reactions, Compiegne. Thymus Update IV.
92. Eglezos, A., Andrews, P.V., Boyd, R.L. and Helme, R.D. (1991). Tachykinin mediated modulation of the primary antibody response in rats: evidence for mediation by an NK-2 receptor. J. Neuroimmunol. **32**: 11-18.
93. Eglezos, A., Andrews, P., Boyd, R.L. and Helme, R.D. (1991). Modulation of the immune response by tachykinins (Review). Immunol. Cell Biol. **69**: 285-294.
94. Boyd, R.L. and Obranovich, T.D. (1991). The role of cytokines in the developing chicken immune and haemopoietic systems. Proc. Australian Poultry Science Symposium. 1991.
95. Godfrey, D.I., Masciantonio, M., Tucek, C.L., Malin, M.A., Boyd, R.L. and Hugo, P (1992). TSA 1: A novel thymocyte marker discriminating immature from mature thymocyte subsets. J. Immunology; **148**: 2006-2011.
96. Wilson, T.J., Van de Water, J., Boyd, R.L. , Abplanalp, H. and Gershwin, M.E.(1992). Abnormalities associated with the bursal microenvironment in spontaneous dysgammaglobulinemia of UCD 140 chickens. Clin. Immunol. Immunopathol. **59**(2): 208-221
97. Boyd, R.L. , Wilson, T.J., Ward, H.A. and Gershwin, M.E. (1992). Phenotypic characterization of chicken thymic stromal elements. Dev. Immunol. **2**: 51-66.

98. Wilson, T.J., Davidson, N.J., Gershwin, M.E. and Boyd, R.L. (1992). Phenotypic analysis of the chicken thymic microenvironment during ontogenetic development. *Dev. Immunol.* **2**: 19-27.
99. Davidson, N.J., Chen, C-L. H. and Boyd, R.L. (1992). Kinetics of chicken embryonic thymocyte development in ovo and in organ culture. *Eur. J. Immunol.* **122**: 1429-1435.
100. Wilson, T.J., Van der Water, J., Mohr, F.C., Boyd, R.L., Ansari, A., Wick, G., and Gershwin M.E. (1992). Avian scleroderma: evidence for qualitative and quantitative T cell defects. *J. Autoimmunity*. **5**: 261-276.
101. Tucek, C.L., Godfrey, D.I. and **Boyd, R.L.** (1992). Five novel antigens illustrate shared antigenicity between mouse thymic stromal cells, thymocytes and peripheral lymphocytes. *Internat. Immunol.* **4**: 1021-1030.
102. Davidson, N.J. and Boyd, R.L. (1992). Delineation of chicken thymocyte subsets by CD3 - TCR, CD4 and CD8 antigen expression reveals phylogenetically conserved and novel thymocyte subsets. *Internat. Immunol.* **4**: 1175 - 1182.
103. Waanders, G.A., Hugo,P. and Boyd, R.L. (1992). Treatment of fetal thymic organ culture with IL-1 leads to accelerated differentiation of subsets of CD4-CD8- cells. *Cell. Immunol.* **143**: 237-245.
104. Duncan,M.R., Wilson,T.J., van der Water, J., Berman, Boyd,R.L., Wick,G. and Gershwin, M.E. (1992). Cultured fibroblasts in avian scleroderma, an autoimmune fibrotic disease, display an activated phenotype. *J.Autoimmunity* **5**: 603 – 615
105. Davidson, N.J. and Boyd, R.L. (1993). Phenotypic mapping of the chicken embryonic thymic microenvironment within an organ culture system. *Dev.Immunol* **3**: 147 - 158.
106. Obryanovich, T.D. and **Boyd, R.L.** (1993). A bursal stromal cell line induces preferential proliferation of MHC class II bearing precursor cells. *Avian Immunology in Progress* (INRA editions, **62**): 119 - 124.
107. Davidson, N.J., Bean, A.G.D. and **Boyd, R.L.** (1993). Chicken embryonic thymus organ culture: cellular development and identification of functionally relevant thymic molecules. *Avian Immunology in Progress* (INRA editions, **62**): 301 - 306.
108. Bean, A.G.D., Davidson,N.J., Ward,H.A. and **Boyd, R.L.** (1993). Two intrathymic lymphoid antigens that define differential thymocyte subsets. *Avian Immunology in Progress* (INRA editions, **62**): 25 - 30.
109. Siatskas, C. and **Boyd, R.L.** (1993). In vitro stimulation of colony formation by cMGF. *Avian Immunology in Progress* (INRA editions, **62**): 137 - 142.
110. Watanabe, Y Naiki, M., Wilson, T.J., Godfrey, D.I.,Chiang, B-L., **Boyd, R.L.** , Ansari,A., and Gershwin, M.E. (1993). Thymic microenvironment abnormalities and thymic selection in NZB. H-2bm12 mice. *J. Immunology* **150**: 4702 – 4712
111. Lahoud, M., Vremec,D., **Boyd, R.L.** and Shortman, K. (1993). Characterisation of

thymic nurse cell lymphocytes using an improved procedure for nurse cell isolation.
Dev. Immunol. **3**: 103 - 112.

112. Boyd, R.L., Tucek, C.L., Godfrey, D.I., Izon, D.J., Wilson, T.J., Davidson, N.J., Bean, A.G.D., Ritter, M. and Hugo, P. (1993) The thymic microenvironment. Immunology Today **14**: 445 - 459.
113. Godfrey, D.I., Tucek, C.L., Izon, D.J., Wilson, T.J., Davidson, N.J., Bean, A.G.D., Ritter, M., Hugo, P and Boyd, R.L. (1993). The thymic microenvironment Immunology Today **14**: Centre-fold poster: 448-449.
114. Ritter, M. and Boyd, R.L. (1993). Development in the thymus: it takes two to tango Immunology Today **14**: 462 - 469.
115. Randle, E., Waanders, G.A. Masciantonio, M., Godfrey,D. and Boyd, R.L. (1993). A lymphostromal molecule, Thymic Shared Antigen-1, regulates early thymocyte development in fetal thymus organ culture. J. Immunol. **151**: 6027 - 6035.
116. Ratcliffe, M.J.H., Boyd, R.L. , Chen , C-L. and Vainio, O. (1993). Avian CD nomenclature workshop: First report. Vet. Immunol. Immunopathol. **38**: 375-386.
117. MacNeil, I., Kennedy,J., Godfrey, D.I., Jenkins, N.A., Masciantonio, M., Mineo,C., Gilbert, D., Copeland, N.G., Boyd, R.L. and Zlotnik, A. (1993). Isolation of a cDNA encoding thymic shared antigen-1: A new member of the Ly6 family with a possible role in T cell development. J.Immunol. **151**: 6913 - 6923.
118. Izon, D.J., Nieland, J.D., Godfrey, D.I., Boyd, R.L. and Kruisbeek, A.M. (1994). Flow cytometric analysis reveals unexpected shared antigens between histologically defined populations of thymic stromal cells. Int. Immunol. **33**: 66-67
119. Vicari, A., Abehsira-Amur, O., Papiernik, M., Boyd, R.L. and Tucek, C.L. (1994). MTS 32 mAb defines CD4+CD8- thymocyte subsets that differ in their maturation level, lymphokine secretion and selection patterns. J. Immunol. **152**: 333-335.
120. Hanke, T., Mitanacht, R., Boyd, R.L. and Hunig, T. (1994). Induction of Interleukin-2 receptor \square chain expression by self-recognition in the thymus. J. Exp. Med. **180**: 1629-1636.
121. Pircher, H., Ohashi, P.S., Boyd, R.L. , Hengartner, H. and Brduscha, K. (1994). Evidence for a selective and multi-step model of T cell differentiation: CD4+CD8low thymocytes selected by a transgenic T cell receptor on major histocompatibility complex class I molecules. Eur. J. Immunol. **24**: 1982 - 1987.
122. Van de Water, J., Boyd, R.L. , Wick, G., and Gershwin, M.E. (1994). The immunologic and genetic basis of avian scleroderma, an inherited fibrotic disease of line 200 chickens. Intern. Rev. Immunol. **11**: 273 - 282.
123. Randle-Barrett, E.S. and Boyd, R.L. (1995). Thymic microenvironment and lymphoid response to sublethal irradiation. Dev. Immunol. **4**: 101 - 116.
124. Takeoka, Y., Yoshida, S.H., van de Water, J., Boyd, R.L. , Suehiro, S., Ansari,T., and Gershwin, E. (1995) Thymic microenvironmental abnormalities in MRL/MP-lpr/lpr, BXSB/MpJ Yaa and C3H/HeJ - gld / gld mice. J. Autoimmunity **8**: 145 – 161

125. Takeoka, Y., Yoshida, S.H., Morita, S., Suehiro, S., **Boyd, R.L.** and Gershwin, M.E.(1995). Influence of neurotropin on thymic microenvironmental abnormalities of NZB mice. Int.J. Immunotherapy xi: 49 - 56.
126. Duncan, M., Berman, B., Van de Water, J. **Boyd, R.L.**, Wick, G. and Gershwin, M.E.(1995). Mononuclear cells isolated from fibrotic skin lesions in avian scleroderma constitutively produce fibroblast-activating cytokines and immunoglobulin M.Int. Archs. Allergy Appl. Immunol. 107: 519 - 526.
127. Takeoka, Y., Whitmer, K.J., Chen, S-Y., Ansari, T., **Boyd, R.L.**, Schultz, L.D., Suehiro, S. and Gershwin, M.E. (1995). Thymic epithelial cell abnormalities in (NZB x H-2^u) F1 mice. Clin. Immunol. Immunopathol. 76: 297 - 307.
128. Davey, G.D., Tucek-Szabo,C.L. and **Boyd, R.L.** (1996). Characterisation of the AKR thymic microenvironment and its influence on thymocyte differentiation and lymphoma development. Leukaemia Research 20: 853 – 866
129. Obryanovich, T.D. and **Boyd, R.L.** (1996) A bursal stromal derived cytokine induces proliferation of MHC class II bearing cells. Dev. Comp. Immunol. 20: 61 - 75.
130. Takeoka,Y., Chen,S-Y., Yago, H., **Boyd, R.L.** , Suehiro,S., Shultz, L.D., Ansari, T. and Gershwin, M.E. (1996). The murine thymic microenvironment changes with age. Int. Archs. Allergy Appl. Immunol. 111: 5 - 12.
131. **Boyd, R.L.** and Siatskas,C. (1996). Improvement of chicken disease resistance by haemopoietic cytokines. Proc. Australian Poultry Science Symposium.
132. Blackburn, C.C., Augustine, C.L., Lui, R., Harvey, R.P., Malin M.A., **Boyd, R.L.**, Miller, J.F.A.P. and Morahan, G. (1996). Cell - autonomous action of the Nude gene product in differentiation of thymic epithelial progenitors. Proc. Natl. Acad. Sci.. 93: 5742 - 5746.
133. Siatskas, C. McWaters, P.G., Digby, M. Lowenthal, J.W. and **Boyd, R.L.** (1996). In vitro characterisation of a novel avian haemopoietic growth factor derived from stromal cells. Dev.Comp.Immunol. 20: 139 – 156.
134. Chen, S-Y., Takeoka, Y., Ansari, T., **Boyd, R.L.** , Klinman,D. and Gershwin, E. (1996). The natural history of disease expression in CD4 and CD8 gene deleted New Zealand Black mice. J.Immunol. 157: 2676 - 2684.
135. Penit, C., Lucas, B., Vasseur,F., Rieker, T. and **Boyd, R.L.** (1996). Thymic medulla epithelial cells acquire specific markers by post-mitotic maturation. Dev.Immunol. 5: 25 - 36.
136. Hala, K., Malin, G., Dietrich, H., Loesch, U., Boeck, G., Wolf, H., Kaspers,B., Geryk, J., Falk, M., Wick, G. and **Boyd, R.L.** (1996). Analysis of the initiation period of spontaneous autoimmune thyroiditis (SAT) in Obese strain (OS) chickens. J.Autoimmunity 9: 129 - 138.
137. Siatskas, C., Lowenthal, J. and **Boyd, R.L.** (1997). Avian Cytokines. Methods in Avian Immunology. 2257 - 2268.
138. Jeurissen, S.H.M., Claassen, E. and **Boyd, R.L.** (1997). Immunohistochemistry in

the analysis of lymphoid organs and their function. Methods in Avian Immunology 2235 - 2245.

139. Chen, S-Y., Takeoka, Y., Pike-Nobile,L., Ansari,T., **Boyd, R.L.** and Gershwin, M.E. (1997). Autoantibody production and cytokine profiles of MHC class I (β 2-microglobulin) gene-deleted New Zealand Black (NZB) mice. Clin. Immunol. Immunopathol. **84**: 318-327.
140. Chidgey, A. and **Boyd, R.L.** (1997). Agonist peptide modulates T cell selection thresholds through qualitative and quantitative shifts in CD8 co-receptor expression. International Immunology, **9**: 1527 - 1536.
141. Takeoka,Y., Chen,S-Y., **Boyd, R.L.** , Tsuneyama,K., Taguchi,N., Morita,S., Yago,H., Suehiro, S., Ansari, A., Schultz, L.D. and Gershwin, M.E. (1997). A comparative analysis of the murine thymic microenvironment in normal, autoimmune and immunodeficiency states. Dev. Immunol. **5**: 79 - 89.
142. Takeo,Y., Naiki,M., **Boyd, R.L.** , Yago, H., Suehiro, S. and Gershwin, M.E. (1997). Neurotropin improves the thymic microenvironment and nephritis in (NZBxNZW) F1 mice. Int. J. Immunotherapy XIII (1/2) 45 - 54).
143. Penninger, J.M., Sirard, C., Mittrucker, H-W., Chidgey, A.P., Kozieradzki, I., Hakem, A., Matsuyama, T., Kimura, T., Timms, E., **Boyd, R.L.** , Taniguchi, T., & Mak, T.W. (1997) The interferon regulatory transcription factor IRF-1 controls positive and negative selection of CD8+ thymocytes. Immunity **7**: 243-254.
144. Chidgey, A.P., Pircher, H., MacDonald, H.R. & **Boyd, R.L.** (1998) An adult thymic stromal cell suspension model for in vitro positive selection shows multiple effects of an agonist peptide. Dev. Immunol **6**: 157-170
145. Classon, B.J. and **Boyd, R.L.** (1998). Thymic shared Antigen-1 (TSA-1): A lymphostromal cell membrane Ly6 superfamily molecule with a putative role in cellular adhesion. Dev. Immunol **6**: 149 – 156.
146. **Boyd, R.L.** (1998). Stromal cells. Encyclopaedia of Immunology 2233 – 2238.
147. Berzins, S.P., **Boyd, R.L.** and Miler, J.F.A.P. (1998) The role of the thymus and recent thymic migrants in the maintenance of the adult peripheral lymphocyte pool. J. Exp. Med. **187**: 1839 – 1848.
148. Chidgey, A.P. & **Boyd, R.L.** (1998) : Positive selection of low responsive potentially autoreactive T cells induced by high avidity, non-deleting interactions. Int. Immunol **10**: 999-1008.
149. **Boyd, R.L.** , Chidgey, A.P., Wallace, V.A., Hakem, A., Mittrucker, H-W., Bouchard, D., Kozieradzki, I., Ionescu, J., Timms, E., Kishihara, K., Ong, C.J., Chui, D., Marth, J.D., Mak, T.W. and Penninger, J. M. (1998) : Receptor- specific allelic exclusion of TCR V α chains during development. J. Immunol. **161**: 1718 – 1727.
150. Williams, G.S., Malin, M., Vremec,D., Chang,C-H., **Boyd, R.L.** , Benoist, C. and Mathis, D. (1999). Mice lacking the transcription factor CIITA- a second look. Int. Immunol. **10**: 1957 – 1967.
151. Ellemor, D., Baird, R., Awad, M., Rood, J., Emmins, J. and **Boyd, R.L.** Use of

genetically manipulated strains of *Clostridium perfringens* reveals both alpha-toxin and theta toxin are required for vascular leukostasis to occur in experimental gas gangrene
Infection and Immunity **67**: 4902 – 4907.

152. Berzins, S., Davey, G.M., Randle-Barrett, E.S. , Malin, M. and **Boyd, R.L.** TSA-2: A novel T cell marker associated with differentiation and activation. J. Immunol. **162**: 5119 – 5126.
153. Katevuo, K., Imhof, B., **Boyd, R.L.** , Bean, A., Chidgey, A., Dunon, D., Goebel, T. and Vainio, O. (1999) ChT1, an IgSF molecule required for T cell differentiation. J. Immunol. **162**: 5685 – 5694.
154. Naquet,P., Naspetti,M. and **Boyd, R.L.** (1999). Development, organization and function of thymic medulla in normal, immunodeficient or autoimmune mice. Seminars in Immunology, **11**: 47 – 56.
155. Berzins, S., Godfrey, D.I., Miller, J.F.A.P. and **Boyd, R.L.** (1999) A central role for thymic emigrants in peripheral T cell homeostasis. Proc. Nat. Acad. Sci. **96**: 9787 – 9791.
156. Takeoka Y, Taguchi N, Kotzin BL, Bennett S, Vyse TJ, **Boyd RL**, Naiki M, Konishi J, Ansari AA, Shultz LD, Gershwin ME. (1999). Thymic microenvironment and NZB mice: the abnormal thymic microenvironment of New Zealand mice correlates with immunopathology. Clin Immunol **3** 388 – 398.
157. Takeoka, Y., Taguchi, N., Shultz, L., **Boyd, R.L.** , Naiki, M., Ansari, A.A. and Gershwin, M.E. (1999). Apoptosis and the thymic microenvironment in murine lupus. J. Autoimmunity **13**: 325 - 334.
158. Taguchi, N., Hashimotot, Y., Naiki, M., Farr, A.G., **Boyd, R.L.** , Ansari, A.A., Shultz,L.D., Kotzin, B.L., Dorshkind, K., Ikehara, S., and Gershwin, M.E. (1999). Abnormal thymic expression of epithelial cell adhesion molecule (Epcam) in New Zealand Black (NZB) mice. J.Autoimmunity **13**: 393 - 404.
159. Lechner O, Wiegers GJ, Oliveira-Dos-Santos AJ, Dietrich H, Recheis H, Waterman M, **Boyd R**, Wick G. (2000). Glucocorticoid production in the murine thymus. Eur J Immunol **30**:337-346.
160. Awad, M.M., Ellemor, D.M., Bryant, A.E., Matsushita, O., **Boyd, R.L.** , Stevens, D.L., Emmins, J.J., Rood, J.I. (2000). Construction and virulence testing of a collagenase mutant of *Clostridium perfringens*. Microbiol. Pathogenesis **28**: 107 – 117.
161. Purton, J., **Boyd, R.**, Cole, T., and Godfrey, D. (2000). Intrathymic T cell development and selection proceeds normally in the absence of glucocorticoid receptor signaling. Immunity **13**: 179-186.
162. **Boyd, R.L.** and Chidgey, A.P. (2000) T cell development and function – a downunder experience. Immunol. Today **21**: 472 – 474.
163. Godfrey, D.I., Purton, J.F., **Boyd, R.L.** , Cole, T.J. (2000). Stress-free T cell development: glucocorticoids are not obligatory. Immunol. Today **21**: (12) 606 – 611.
164. Godfrey DI, Purton JF, **Boyd RL**, Cole TJ. (2001). Glucocorticoids and the

thymus: the view from the middle of the road. *Trends Immunol.* **22**:243-244

165. Chidgey, A.P. and **Boyd, R.L.** (2001) Thymic stromal cells and positive selection. *A.P.M.I.S* **109**: 481-492.
166. Awad, M.M., Ellemor, D.M., **Boyd, R.L.**, Emmins, J.J. and Rood J.I., (2001). Synergistic effects of α -toxin and perfringolysin O in Clostridium perfringens-mediated gas gangrene. *Infection and Immunity* **69**(12): 7904-7910.
167. Gray, D.H.D., Chidgey, A.P. and **Boyd, R.L.** (2001). Analysis of thymic stromal cell populations using flow cytometry. *J. Immunol. Meths* **260**:15-28.
168. Ueno, T., Hara,K., Swope Willis,M., Malin,M, Höpken,U.E., Gray,D., Matsushima,K., Lipp,M., Springer,T., **Boyd,R.**, Yoshie,O., and Takahama,Y. (2002).Role for CCR7 ligands in the emigration of newly generated T lymphocytes from the neonatal thymus. *Immunity* **16**: 205 -218.
169. Zammit,D., Berzins, S., Gill,J., Barnett, L., Koentgen, F., Lambert, G.W., Harvey,R.P., **Boyd, R.L.** and Classon, B.J. (2002). Essential role for the lymphostromal plasma membrane Ly6 superfamily molecule Thymic Shared Antigen 1 in development of the embryonic adrenal gland. *Molec. Cell Biol.* **22**: 946-952.
170. Okada,T., Lian, Z-X., Hsu, T., Naiki, M., Ansari, A., Robinson, D., Kung, H-J., **Boyd, R.** and Gershwin, M.E. (2002). Elevated C-met in thymic dendritic cells of New Zealand Black mice. *Dev.Immunol.* **9**: 29-34.
171. Blackburn, C. C., Manley, N.R., Palmer, D.B., **Boyd, R.L.** , Anderson,G., and Ritter,M.A. (2002). One for all and all for one: thymic epithelial stem cells and regeneration. *Trends in Immunol.* **23**: 391-395
172. Gill, J., Malin, M., Holländer, G.A., and **Boyd, R.L.** (2002). Generation of a complete thymic microenvironment by MTS 24+ thymic epithelial cells. *Nature Immunology* **3**: 635 – 642.
173. Berzins, S.P., Uldrich, A.P., Sutherland, J.S., Gill, J, Miller, J.F., Godfrey, D.I., **Boyd R.L.** (2002). Thymic regeneration: teaching an old immune system new tricks. *Trends Mol Med.* **10**: 469-76.
174. Flentjar, N.J., Crack, P.J., **Boyd,R.L.**, Malin,M., de Haan,J.BZ., Hertzog, P., Kola,I., and Iannello,R. (2002). Mice lacking glutathione peroxidase-1 activity show increased tunel staining and an accelerated inflammatory response in brain following a cold-induced injury. *Exp. Neurology* **177**: 9-20.
175. Balciunaite, G., Keller, MP., Balciunaite,E., Piali, L., Zuklys,S., Yves D. Mathieu,Y.D., Gill, J., **Boyd, R.** , Sussman, D.J., and Holländer, G.(2002). Wnt glycoproteins regulate expression of FoxN1, the gene defective in nude mice. *Nature Immunology* **3**, 1102 - 1108.
176. Hugo, P and **Boyd, R.** (2002). "Thymus".Encyclopeaedia of Life Sciences.p1-11.
177. Gill,J., Malin,M., Sutherland,J., Gray,D., Goldberg,G., Hollander,G., and **Boyd, R.L.** (2003) Thymic generation and regeneration. *Immunological Reviews*. **195**: 28-50.

178. Malcolm, KM, Gill, J, Leggatt, G.R., **Boyd, R.**, Lambert, P. and Frazer, I.H (2003). Expression of the HPV16E7 oncoprotein by thymic epithelium is accompanied by disrupted T cell maturation and a failure of the thymus to involute with age. Clin. Dev. Immunol **10**: 91-103.
179. Ueno T, Saito F, Gray DH, Kuse S, Hieshima K, Nakano H, Kakiuchi T, Lipp M, **Boyd RL**, Takahama Y. (2004) CCR7 signals are essential for cortex-medulla migration of developing thymocytes, J. Exp. Med. **200**(4):493-505.
180. Van den Brink, M., Alpdogan, O. and **Boyd, R.** (2004). Strategies to enhance T cell reconstitution in immunocompromised patients. Nature Reviews. Immunology, **4**(11): 856- 867.
181. Liston A., Gray,, D.H.D., Lesage, S., Fletcher, A.L., Wilson, J., Webster, K.E., Scott, H.S., **Boyd, R.L.** , Peltonen, L., and Goodnow,C.C.(2004). Gene Dosage-limiting Role of Aire in Thymic Expression, Clonal Deletion, and Organ-specific Autoimmunity J. Exp. Med. **200**(8): 1015-102.
182. Liston A., Lesage, S., Gray, D.H.D., O'Reilly, L.A., Fahrer, A.M., **Boyd, R.L.**, Wilson, J., Baxter, A.G., Gallo,E.M., Crabtree, G.R., Peng, K., Wilson, S.R. and Goodnow, C.C. (2004). Generalized resistance to thymic deletion in the NOD mouse: A polygenic trait characterised by defective induction of Bim. Immunity **21**(6): 817 - 830.
183. Gray, D.H.D., Gill, J.W., Trounson, A.O., and **Boyd, R.L.** (2004). Thymus and tolerance in transplantation. Handbook of Stem Cells, Volume 1, Elsevier, Academic Press. 675- 686.
184. Gray, D.H.D., Ueno,T., Chidgey,A., Goldberg,G., Takahama, Y. and **Boyd, R.L.** (2005). Controlling the thymic microenvironment. Curr Opinion Immunol **17**: 137-143.
185. Liston, A., Lesage, S., Gray, D.H.D., **Boyd, R.L.** and Goodnow, C.H. (2005). Genetic lesions in T-cell tolerance and thresholds for autoimmunity. Immunological Reviews, **204**: 87 – 101.
186. Sutherland, J.S., Goldberg, G.L., Hammett, M.V., Uldrich,, A.P., Berzins, S.P.,Heng, T.S., Blazar, B.R., Millar, J.L., Malin, M.A., Chidgey, A.P., and **Boyd, R.L.** (2005). Activation of thymic regeneration in mice and humans following androgen blockade. J. Immunol., **175**: 2741- 2753
187. Heng, T.S.P., Goldberg, G.L., Gray, D.H.D., Sutherland, J.S., Chidgey,A.P. and **Boyd.R.L.**(2005) Effects of castration on thymocyte development in two different models of thymic involution. J. Immunol., **175**: 2982-2993
188. Goldberg, G.L., Sutherland, J.S., Hammet, M.V., Milton, M.K., Heng, T.S.P., Chidgey, A.P., **Boyd, R.L.** (2005). Sex Steroid ablation enhances lymphoid recovery following autologous haematopoietic stem cell transplantation. Transplantation. **80**: 1604- 1613.
189. Kennedy, C., Krejany, E., Young, L., Awad, M.M., **Boyd, R.L.**, Emmins, J.J., Lyras, D. and Rood, J.I. The α toxin of *Clostridium septicum* is essential for virulence, Molecular Microbiology. (In press).

190. Brodnicki, T.C., Fletcher, A.L., Pellicci, D.G., Berzin S.P., McClive, P., Quirk, F., Webster¹, K.E., Scott, H.S., **Boyd, R.L.**, Godfrey, D.I., Morahan,G. Localization of *Idd11* Is Not Associated with Thymus and NKT Cell Abnormalities in NOD Mice. *Diabetes*. (in press).
191. Alpdogan O, Hubbard VM, Smith OM, Patel N, Lu SX, Goldberg GL, Gray DH, Feinman J, Kochman AA, Eng JM, Murgilan SJ, Suh D, **Boyd RL**, van den Brink MR. Keratinocyte Growth Factor (KGF) Is Required For Post-Natal Thymic Regeneration. *Blood*. (in press).
192. Kurobe, H., Liu, C., Ueno, T., Saito, F., Ohigashi, I., Seach, N., Arakaki, R., Hayashi, Y., Kitagawa, T., Lipp, M., Boyd, R.L., and Takahama,Y. CCR7-dependent cortex to medulla migration of positively selected thymocytes is dispensable for T-cell maturation and thymic export but is essential for establishing central tolerance. *Immunity* (in press).
193. Uldrich, A.P., Berzins, S.P., Malin, M.A., Bouillet,P., Strasser, A., Smyth, M.J., Boyd, R.L. and Godfrey, D.I. (2006). Antigen challenge inhibits thymic emigration. *J. Immunol.* 176: 4553-4561